

**SINGLE TARGET COUNTING ASSAYS USING SEMICONDUCTOR
NANOCRYSTALS**

ABSTRACT OF THE DISCLOSURE

The present invention provides assays that allow for the detection of a single
5 copy of a target of interest. The target species is either directly or indirectly labeled with a
semiconductor nanocrystal, "quantum dot." The bright and tunable fluorescence of the
quantum dot is readily detected using methods described herein. Also provided are assays
that are based on the colocalization of two or more differently colored quantum dots on a
single target species, which provides superbly sensitive assays in which the decrease in assay
10 sensitivity caused by non-specific binding of assay mixture components to the assay substrate
is minimized. The assays are of use to detect target species including, but are not limited to,
nucleic acids, polypeptides, small organic bioactive agents (e.g., drugs, agents of war,
herbicides, pesticides, *etc.*) and organisms.

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